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Drawing Amendments

Please add the label "14A" to Figure 1B as shown in
Replacement Sheet 1.

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Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to further clarify Applicants invention to clearly define over the prior art.

No new matter has been added.

For example, support for the amendments and new claims are found in the originally and previously presented claims, the Figures (including Figures 2A and 2B) and the Specification:

[0021] Referring to FIG. 2A is shown an exemplary memory cell formed by the previously outline steps. For example conductive plugs 14A and 14B are formed in ILD layer 12, spacers 18A and 18B forming bottom electrodes, and **an exposed bottom electrode contact area e.g., A, exposed for contacting a phase change memory elements e.g., 22A and 22B** determined by etchback of SOL layer 20. Dielectric portion 16 is shown formed overlapping a portion of conductive plugs 14A and 14B allowing formation of thinner spacer bottom electrodes 18A and 18B. **Phase change memory elements 22A and 22B are formed to encompass the electrode contact areas e.g., A to form a memory element contact areas over respective spacer bottom electrodes 18A and 18B.** Second and third ILD layers 24A and 24B including conductive upper electrode portions 26A and 26B are then formed as previously outlined.

[0022] Referring to FIG. 2B, in another embodiment a similar series of process steps as outlined for FIGS. 1A through 1F are carried out to form a memory cell **except that spacers 28A and 28B**

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now form the phase changing material memory elements where an etchback process of SOL layer 20 exposes a portion e.g., B of the upper portion of the spacers to form a memory element electrode contact area with the top electrode. In this embodiment, the dielectric portion 16 is not formed to partially overlap the conductive plugs 14A and 142B, which now form the bottom electrodes. In this embodiment the bottom electrode contact area may be adjusted by determining the overlap width, W1, the spacers 28A and 28B overlap the conductive plugs 14A and 14B.

Claim Rejections under 35 USC 112

1. Claims 26-27 stand rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement.

Examiner contends that the following claim language "a spacer comprising a phase changing material sensitive to temperature and having a partially exposed sidewall region at the spacer upper portion defining a phase change memory element contact area;" violates the written description requirement.

Examiner asserts that the specification provides support "for a spacer with a partially exposed sidewall region at the spacer upper portion (See Figure 1D) and accompanying text). The originally filed specification, however, does not provide support for a spacer comprising a phase changing material as recited in claim 26. Thus, the recitation a spacer comprising a phase changing material sensitive to temperature is new matter."

Examiner is referred to originally filed claims 23 and 40:

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23. The phase change memory structure of claim 22, wherein the spacer **comprises a phase changing material sensitive to temperature.**

40. A phase change memory structure comprising:

a substrate comprising a conductive area; and,

a spacer having a partially exposed positive radius of curvature at the spacer upper portion defining a phase change memory element contact area, the spacer comprising a material selected from the group consisting of a conductive material and a **phase change material sensitive to temperature;**

wherein the spacer bottom portion partially overlaps the conductive area.

See also paragraphs 004 and 0019:

"One goal for producing phase changing memory cells is to reduce the power consumption by reducing the amount of drive current required to effect a phase change in the phase changing memory element. The required drive current is dictated by the resistance of the phase changing material as well as the active area of the phase changing material, which is dictated by the area to which electric contact is made to the phase changing material (phase change memory element) to deliver a phase changing current. In general, assuming a given resistance of the phase changing material, **a smaller contact area produces a higher resistance and therefore a higher level of resistive heating (temperature) for a given applied writing (drive) current.** Therefore a smaller electrode contact area to the phase changing material memory element will correspondingly and desirably reduce drive current and thereby power consumption.

"Referring to FIG. 1E, **a temperature sensitive (phase change triggering) phase changing (structure changing) material layer,** for example a chalcogenide including Ge, Te, and Sb, is blanket deposited by a conventional deposition process followed by a photolithographic patterning of the phase changing layer and a wet and/or dry etching process to form a phase change memory element portion 22A in contact with the exposed upper portion (electrode contact area), e.g., A of the conductive spacer 18A

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bottom electrode. It will be appreciated that the dimensions of the memory element portion 22A may be varied, for example shown to be about the same width as the bottom electrode (conductive plug 14A) but may be formed having larger or smaller dimensions. Preferably, however, the memory element portion is formed at least large enough to cover the exposed portion of the bottom electrode, e.g., A which is determined by the etchback time to uncover a predetermined portion of the upper portion of the spacer 18A.

Examiner is referred to the following elements of the MPEP:

ADEQUACY OF WRITTEN DESCRIPTION

A. Read and Analyze the Specification for Compliance with 35 U.S.C. 112, para. 1

Office personnel should adhere to the following procedures when reviewing patent applications for compliance with the written description requirement of 35 U.S.C. 112, para. 1. The examiner has the initial burden, after a thorough reading and evaluation of the content of the application, of **presenting evidence or reasons why a person skilled in the art would not recognize that the written description of the invention provides support for the claims.** There is a strong presumption that an adequate written description of the claimed invention is present in the specification as filed, *Wertheim*, 541 F.2d at 262, 191 USPQ; however, with respect to newly added or claims, applicant should show support in the disclosure for the new or amended claims.

“[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom.” *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)

It is now well accepted that a satisfactory description may be in the claims or any other portion of the originally filed specification.

See MPEP, 8th Ed, Section 2163 (I)

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While there is **no *in haec verba* requirement**, newly added claim limitations must be supported in the specification through **express, implicit, or inherent disclosure**.

See MPEP, 8th Ed, Section 2163 (I) (B)

The fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as now claimed. See, e.g., *Vas-Cath, Inc.*, 935 F.2d at 1563-64, 19 USPQ2d at 1117.

Possession may be shown in many ways. For example, possession may be shown by **describing an actual reduction to practice of the claimed invention**. Possession may also be shown by a clear depiction of the invention in detailed drawings or in structural chemical formulas which permit a person skilled in the art to clearly recognize that applicant had possession of the claimed invention. An adequate written description of the invention may be shown by any description of sufficient, relevant, identifying characteristics so long as a person skilled in the art would recognize that the inventor had possession of the claimed invention. See, e.g., *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323, 56 USPQ2d 1481, 1483 (Fed. Cir. 2000)

Applicants respectfully assert that one of ordinary skill would clearly understand that Applicants invention encompasses and **explicitly refers to a spacer comprising a phase changing material sensitive to temperature** in both the specification and the originally filed claims.

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Thus, Examiner is mistaken in his rejection and has failed to make out a prima facie case that Applicants claim language violates the written description requirement.

2. Claim 30 has been amended to overcome Examiners rejection under Section 112, second paragraph.

Claim Rejections under 35 USC 102

1. Claims 26-33 stand rejected under 35 USC 102(e) as being anticipated by Lowrey et al. (US 6,969,866)

Lowery discloses forming a sidewall spacer (e.g., two layers) of a conductive material within a trench (e.g., Figure 7, 344, 346) where the **area of contact of the sidewall spacer e.g., 344 with the memory (phase changing) material layer 250 is the top of a horizontally flat layer** controlled by etching back one of the layers 346 (col 11, lines 21-52). Alternatively the area of the spacers in contact with the phase changing material layer is controlled by etching back the top portion of the layer 130a,b shown in cross section in Figure 6) to form a **narrowed column 188 (with a negative radius of curvature sloping upward)** to contact

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the memory (phase changing) material (col 10, lines 50-63).
Alternatively, conductive material is deposited into a via hole to form an annular conductive spacer 400, with **annular top edge 402 (Figure 9) (shown as a horizontally flat upper surface)** where the entire annular top edge makes contact with the memory material 250 (col 13, lines 29-64).

Thus, Lowery fails to disclose several aspects of Applicants invention including those elements in **bold type**:

With respect to claim 26:

"A phase change memory structure comprising:

a substrate comprising a conductive area;

a spacer comprising a phase changing material sensitive to temperature and having a partially exposed sidewall region at the spacer upper portion defining a contact area, **said contact area comprising an upward sloping positive radius of curvature;** and

an upper conductive electrode on said contact area;

wherein a spacer bottom portion partially overlaps the conductive area and said upper conductive electrode at least

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partially overlaps said contact area."

With respect to claim 28:

"A phase change memory structure comprising:

a substrate comprising a conductive area;

a spacer having a partially exposed sidewall region at the spacer upper portion defining a contact area, **said contact area comprising an upward sloping positive radius of curvature;**

wherein the spacer comprises a material selected from the group consisting of a conductive material and a phase changing material sensitive to temperature; and,

wherein a spacer bottom portion at least partially overlaps the conductive area."

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051,

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1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Conclusion

The cited reference fails to produce or suggest Applicants invention and is therefore insufficient to make out a *prima facie* case of anticipation.

The claims have been further amended to further clarify Applicants invention over the prior art. A favorable consideration of Applicants' claims is respectfully requested.

Based on the foregoing, Applicants respectfully submit that the Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

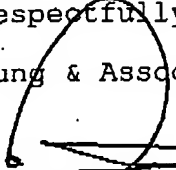
In the event that the present invention as claimed is not in condition for allowance for any reason, the Examiner is respectfully invited to call the Applicants' representative at his

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Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

Tung & Associates



Randy W. Tung
Reg. No. 31,311
Telephone: (248) 540-4040